

Cross-Cutting Issue Paper—Common/Shared EB/EC Architecture

Group 4: Software Quality and Interoperability for Electronic Business

I Introduction:

A wide-ranging series of architectural techniques have been proposed to facilitate implementation of Electronic Business/Electronic Commerce throughout the Department of Defense. This issue paper addresses the need for an EB/EC architecture that describes EB/EC processes in a comprehensive manner including interfaces to other processes and the information technology required to support those processes so that EB/EC might be effectively employed.

II Background:

The need for an "Overarching" or Common/shared EB/EC architecture was expressed at the "Cross-cutting" Issue meeting of all the panels' co-chairs and the ECCWG sponsors. The architecture issue arose from discussions as to how the various EB/EC initiatives were being addressed in a comprehensive manner. That is, was there an overall Department wide architecture being prepared that integrated all the various EB/EC operations (electronic funds transfer, paperless contracting, etc) and that described the interrelationships with other processes in the Department and the supporting communications/computing infrastructure. The answer at the meeting was no, there was not. Because this issue seemed to be related to interoperability, it was given to the co-chairs of the Software Quality and Interoperability working group to address. It is in this context that this paper was written.

Current architecture methodologies provide mechanisms for linking business needs to system requirements to technology solutions using a common nomenclature. Based on industry feedback, architecture, when used correctly, is a critical success factor in reducing cycle times and risk in assembling COTS based solutions, a tenant of EB/EC. Architectural techniques are used to abstract essential relationships between business needs and implementation alternatives using Information Technology. This ability to relate essential information that is often difficult to relate is what architectures bring to the table -- a way to dynamically model enterprise systems (technical architectures) to successfully navigate a continuous flow of technical data and relate it to changing business needs. Since EB/EC is a commercially driven paradigm, it is logical that we look to commercial industry for the best practices in making this paradigm shift successful.

III *Problem Statement:*

There appears to be no comprehensive architectural descriptions of the dimensions of EB/EC in the Department. JECPO has started to define one architectural dimension, i.e., a method of defining a business -derived architecture, but the effort is not complete nor does there seem to have unanimity across the Department on its validity. Connections need to be made between the EB/EC business processes themselves and the Information Technologies that support those processes. For example, electronic funds transfer can be independently implemented across the Department but, unless the business process owners understand the implications of that capability on their processes, inefficiencies or redundancies can result. This could mean the ineffective use of that EB/EC capability.

IV. *Discussion:*

One of the challenges faced by the working group was in determining what exactly is meant by the term “architecture” in an EB/EC context. Early discussion helped to invalidate common assertions that architecture was somehow synonymous with a modeling language, such as the Universal Modeling Language (UML), while it was recognized that modeling languages play an important role in application architectures generally. For systems and technical architectures, industry has embraced mechanisms for modeling business that take advantage of Objects, Internet and the Web. These new distributed computing models use Architecture Definition Languages (ADL) and Architecture Rendering Methodologies (RM-ODP, TOGAF, OMA).

The key is that architectures provide a way to codify designs in unambiguous terms. Specifications define the components, standards define the processes and architectures define how the pieces go together. Without an architectural element, there is a great deal of ambiguity left for implementers to address, which is part of the reason why there is some resistance to architectural specification and consideration. Where ambiguity exists, solution provider or developer has a great deal of flexibility over the final implementation.

It is also important to recognize that the architectures and the architectural process taken alone are not the singular determinants of the value of using architectures. Architectures and architectural tools are most effective when applied by intuitive and innovative individuals who are skilled in their use and experienced in applying their results. Intuition is valuable when examining the varying views of organizations and infrastructure to be able to seize on the essential elements that will bring order to what to most would simply be chaos. Innovation is particularly

valuable in synthesizing the elements of existing processes, data, constraints, and emerging needs into a series of target architectures that can be analyzed for benefits and problem areas. Gathering critical functions into process subsystems so that they might be retained as change occurs might be an output of this activity. Once the intuition and innovation are over, the hard work of deciding which of the target alternatives that should be chosen still remains. Failures often occur when decision making is attempted before sufficient insight has been gathered through intuitive ordering of essential processes, crucial constraints, and emerging needs.

Based on the evidence gathered thus far from commercial industry best practices in the area of EB/EC technology adoption, a key factor in reducing cycle times of the *engineering* process is a streamlined *architecture* process. To enable this outcome, early EB/EC adopters appear to have a common approach; increasing reliance on end-to-end architectures. Multinational organizations like Boeing, EDS, Citigroup, Bell Atlantic, GM and others have developed formal architecture approaches for creating EB/EC standards and technologies baselines. They have also established a common information infrastructure to provide a common back plane for plug-and-play with the Internet and with component technology being a key enabler. This has two benefits, it reduces the redundant infrastructure contained in individual applications and it allows business areas to focus on what is key to their success -- the application layer.

IT architects need a standard language of common mainstream for enterprise integration and abstraction concepts. They need to be able to consider the entire enterprise, and then focus on key elements without losing the overall perspective in order to assess if their enterprise is taking them where their organization needs to go. And if so, which emerging technologies can be effectively leveraged without disrupting their adopted architecture. Successful large industry IT organizations have already made the investment internally to standardize their architectural lexicons and practices. If the government is going to successfully adopt and leverage e-business, it must adopt the architectural practices and lexicons of successful large-multinational organizations.

IV *Alternatives:*

One alternative is to apply architectural techniques in the context of their traditional use. The benefits of architectural definition would apply as effectively to EB/EC as it has to the myriad of applications of information technology to business improvement in recent years. More traditional use has been defined by both the OMG and Open Group and generally provides a means of gathering and ordering thought as an initiator and facilitator of the design process. Architectural tools are not claimed to be design tools or decision making tools by their creators. Unfortunately, those looking for “magic bullet” solutions tend to extend the potential

for ordering thought and facilitating the understanding of relationships, based upon analysis of alternatives within the order of architectural definitions, to actually making the hard decisions related to product selections.

There is no disputing the value of architectural techniques in ordering thought and facilitating decision-making. Application of these techniques, using the full range of views including business process views, would provide significant value in facilitating EB/EC implementations. Architectural techniques would be most effective in defining the full range of conditions that must be met for interoperability. However, the jury is still out on the specific values of the latest tools in addressing the full spectrum of decisions. Each of the tools has been developed with a specific orientation in mind. The potential generic use of specific tools has been claimed but has not been objectively validated. Extension of architectural tools beyond the more traditional uses defined in OMG's RM-ODP and Open Group's TOGAF should only be attempted by those experienced individuals willing to take the risks of early adoption

V Recommendations:

◆ Majority Opinions

The DoD CIO, supported by the Department's Services and Agencies, should prepare an EB/EC architecture, as part of the GIG Architecture, encompassing all EB/EC processes and operations. First draft of the EB/EC architecture should be completed by December 2000.

DoD should continue its search for a common architectural lexicon that is suited to its use. However, it should consider adoption of such a common lexicon only after ascertaining that that lexicon is an established and truly common one and not associated with a "tool de jour".

◆ Minority Opinions - none

VI Implementation Concerns

The choice of a standard architectural tool or lexicon for DoD is problematic. There is little evidence of maturity of any product or unanimity in judged value to allow choice of a specific tool or technique as the DoD standard tool.

VII Resource Implications

Refocused architectural efforts will require dedicated resources.